Risk-Taking Behaviors and Subgrouping of College Students: A Latent Class Analysis

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Risk-Taking Behaviors and Subgrouping of College Students: A Latent Class Analysis

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Abstract

Risk-taking behaviors have negative consequences on adolescent and young adult's health. The aim of this study was to identify the subgroups of college students on the basis of risk-taking behaviors and to assess the role of demographic characteristics, religious beliefs, and parental support on membership of specific subgroup. The cross-sectional study took place in Tabriz (northwest of Iran) in April and May of 2011. The randomly selected sample consisted of 1,837 college students. A survey questionnaire was used to collect data. Latent class analysis was performed to achieve the study's objectives. Four latent classes were identified: (a) low risk, (b) cigarette and hookah smoker, (c) sexual and drinking risk-takers (for males)/sexual risk takers (for females), and (d) high risk. Notably, 13.3% of the males and 4.3% of the females were in the high-risk class. The results identified evidence of protective influence of familial support and religiosity on risky behaviors. A fair number of college students, males in particular, were identified as high risk-takers. Design and implementation of preventive interventions for this segment of the population are necessary. Higher level of familial support and religiosity may serve as preventive factors in risk-taking behaviors.

Keywords

latent class analysis, familial support, religiosity, risk-taking behaviors, college students

Introduction

Risk behavior is defined as a "specific form of behavior, which is proven to be associated with increased susceptibility to a specific disease or ill-health" (World Health Organization, 1998). A considerable amount of risk-taking research underlines the negative consequences of risk-taking behaviors associated with health in youth. For example, reckless behavior, criminal activities such as stealing, sexual behavior, smoking, heavy drinking, drug use and abuse, and reckless driving are regarded as potentially risky behaviors that may have negative long-term consequences (Gonzalez et al., 1994; Resnick et al., 1997). Considering these long-term negative consequences, risk-taking behavior has become one of the most important topics of youth studies.

Characterizing subgroups of young people in terms of risk-taking behaviors allows health service providers and policy makers to identify individuals who are similar to each other based on patterns of risky behaviors (Collins & Lanza, 2010; Reboussin, Song, Shrestha, Lohman, & Wolfson, 2006). There is a paucity of research aimed at classifying college students on the basis of the patterns of risk-taking behaviors. The utility of latent class analysis (LCA) for characterizing patterns of other subjects such as adolescent substance use has been demonstrated (Cleveland, Collins, Lanza, Greenberg, & Feinberg, 2010; Dierker, Vesel, Sledjeski, Costello, & Perrine, 2007).

The LCA, a statistical method for finding subtypes of related cases (latent classes), uses multivariate categorical data to assign class memberships empirically to individuals and assumes that a small number of mutually exclusive latent groups or classes can be identified (Collins & Lanza, 2010). A few studies have used latent classes to represent patterns of adolescent substance use. For example, Shin, Hong, and Hazen (2010) employed

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quantitative differences to identify four and three heterogeneous classes of girls and boys, respectively, on the basis of the lifetime probabilities of the use of six illicit substances, namely, alcohol, cannabis, amphetamines, cocaine, opiates, and hallucinogens. The authors classified female adolescent substance users into four classes: (a) abstainers/low users, (b) moderate alcohol and cannabis users, (c) high alcohol/cannabis and moderate amphetamine/cocaine users, and (d) heavy polysubstance users. Male adolescent substance users were classified into three groups: (a) abstainers/low users, (b) high alcohol/cannabis and low amphetamine users, and (c) heavy polysubstance users.

A great deal of research has focused on the identification of factors that elevate or reduce the risk of engaging in high-risk behaviors among young people (Dew et al., 2008; Gryczynski & Ward, 2011). The literature suggests that religious individuals tend to demonstrate a range of healthy behaviors (Seybold & Hill, 2001; Townsend, Kladder, Ayele, & Mulligan, 2002). Additionally, there are studies that support the indirect effects of religiosity on the health status of individuals through promoting positive health behaviors such as healthy eating, physical activity, and modifying and/or preventing unhealthy behaviors like smoking and drug use (Farhadinasab, Allahverdipour, Bashirian, & Mahjoub, 2008; Rabinowitz, Mausbach, Atkinson, & Gallagher-Thompson, 2009). Parental support is another factor that protects youth against risky behaviors. Evidence identifies that adolescents from more cohesive families are less likely to smoke or use substances (Piko, 2000; Sneed, Morisky, Rotheram-Borus, Ebin, & Malotte, 2001; Wills, Resko, Ainette, & Mendoza, 2004). However, there is no information about the association of these variables with subgroups of risk-taking behaviors.

Based on the above-mentioned background, the aim of this study was to (a) identify the subgroups of college students on the basis of risk-taking behaviors by sex, (b) document the prevalence of the subgroups, and (c) assess the role that demographic characteristics, religious beliefs, and parental support may play in forming the classifications.

Materials and Method

Design, Sample, and Setting

The cross-sectional study was conducted in Tabriz, Iran, during the months of April and May of 2011. Permission to conduct the study was obtained from the Ethics Committee at Tabriz University of Medical Sciences. A multistage random sampling was conducted. There are nine universities in Tabriz. In the first stage, in each university, three colleges were randomly selected. In the second stage, in proportion to the number of students in each university and each college, a total of 2,128 students were randomly selected. All were invited to complete a survey questionnaire designed to collect data on risk-taking behaviors, perceived parental support, religiosity, and selected demographic characteristics. A total of 1,837 (86.3%) completed the questionnaire. The respondents were ensured about the voluntary nature of participating in the study and confidentiality of the information before distributing the questionnaire; also, they were asked not to enter their personal information in the questionnaire. All had signed an informed consent form.

Study Tools

The survey questionnaire was piloted-tested by 97 college students who were similar to the study participants. The purpose of the pilot test was to (a) examine the feasibility of the questionnaire and (b) collect data to examine its reliability. The pilot test input was used to modify the instrument.

Five dichotomous variables were used to assess risk-taking behaviors. The variables were (a) cigarette smoking (smoking 100 cigarettes or more in lifetime irrespective of current smoking status), (b) alcohol use in the past 30 days, (c) hookah use (at least once per month), (d) substance abuse, and (e) having unsafe sex (i.e., using drugs or alcohol before the last sexual relationship, having sexual intercourse with numerous persons, or having sex without using condom for prevention of sexually transmitted diseases).

Religious beliefs were measured by 28 items derived from Kendler's General Religiosity Scale (Kendler et al., 2003), which has been translated into Farsi by Farhadinasab et al. (2008). Examples of items are the following: (a) I ask God to help me make important decisions; (b) I feel God's love for me, directly or through others; and (c) every day I see evidence that God is active in the world. A 5-point Likert-type scale was used: 1 = *completely disagree*, 2 = *disagree*, 3 = *neutral*, 4 = *agree*, and 5 = *completely agree*. The scores of this test ranged from 28 to 140, with higher scores indicating higher religious beliefs. An estimated reliability coefficient of .97, as computed by Cronbach's coefficient alpha, attested to the internal consistency of the 28-item scale.

Parental support was measured by the Persian version of Aneshensel and Sucoff's 13-item questionnaire (Aneshensel & Sucoff, 1996). Examples of the items are the following: (a) my mother and/or father show me if I can trust them/him/her and (b) my mother and/or father really understand me. A 5-point Likert-type scale was used, ranging from 1 to 5, with 3 indicating a neutral point of view. There was one negatively stated item (My mother and/or father don't/doesn't pay enough attention

Table 1. Percentages of Students Responding "Yes" to Questions About Risk-Taking Behaviors.

	Male (*N* = 737)			Female (*N* = 1,100)			Total (*N* = 1,837)		
Items	*n*	%	95% CI	*n*	%	95% CI	*n*	%	95% CI
Smoking	210	28.5	25.5-31.7	78	7.1	5.7-8.8	291	15.8	14.2-17.6
Hookah use	115	15.6	13.2-18.4	42	3.8	2.8-5.1	156	8.5	7.3-9.9
Alcohol use	105	14.2	11.9-17.0	44	4.0	3.0-5.3	147	8.0	6.9-9.3
Substance abuse	89	12.1	9.9-14.6	52	4.7	3.6-6.2	140	7.6	6.5-8.9
Sexual risk behavior	107	14.5	12.2-17.3	91	8.3	6.8-10.1	198	10.8	9.4-12.3

Note. CI = confidence interval.

Table 2. Comparison of LCA Models With Different Latent Classes Based on Model Selection Statistics.

Number of latent classes	Number of parameters estimated	G^2	*df*	*p*	AIC	BIC	Maximum log-likelihood
1	10	677.4	53	.0001	696.4	751.7	−2810.9
2	22	78.0	41	.0004	122.0	243.6	−2511.7
3	34	45.5	29	.0261	113.5	301.4	−2495.5
4	46	12.0	17	.8001	104.0	352.2	−2483.7
5	58	14.0	5	.0156	130.0	450.4	2479.7
6	Not well identified						
7	Not well identified						

Note. LCA = latent class analysis; AIC = Akaike information criterion; BIC = Bayesian information criterion.

to me), which was reverse-coded for the purpose of data analysis. The scores of this test ranged from 13 to 65, with higher scores indicating higher parental support. The internal consistency of the scale was estimated to be .86.

Statistical Analysis

The LCA by sex as a grouping variable was used in data analysis. The LCA is a latent categorical variable's model, and it classifies homogeneous individuals. It assumes that besides the measurement error, whether the correlation between observed variables could be justified by latent variable categories. By various iterations for the number of identified classes of the latent variable and comparing the frequencies of the observed response patterns with the expected ones, the LCA determines the best model and calculates a statistics similar to χ^2 called G^2. Based on G^2 statistic, Akaike information criterion (AIC) and Bayesian information criterion (BIC) can be calculated for model selection. For all information criteria, a smaller value represents a more optimal balance of model fit and parsimony; thus, a model with the minimum AIC or BIC might be selected. For performing LCA, five dichotomous observable variables (i.e., indicators) were used for assessing risk-taking behaviors as a latent variable. These indicators were smoking, hookah use, alcohol use, substance abuse, and sexual risk behavior. After finalizing model, we entered age, marital status, religious beliefs, and parental support as covariates in the LCA model. Analyses were conducted by using proc LCA in SAS 9.2 software.

Results

The participants ranged in age from 18 to 34 years (mean = 22.1 ± 2.3). The majority of the sample was female (59.9%). Nearly 8.0% (147) of the participants were married. The means and standard deviations for parental support and religious beliefs were 49.0 ± 10.4 and 110.7 ± 17.9, respectively.

A summary of risk-taking behaviors is shown in Table 1. The results suggested that the prevalence of some of the risk-taking behaviors (e.g., smoking) were higher than the others. Additionally, it was found that risk-taking behaviors were more prevalent among males compared to females.

On the basis of the five dichotomous indicators, there were 32 possible response patterns. We attempted to fit the LCA models with classes ranging from 1 to 7 by considering the sex of students as a grouping variable. For each LCA model, G^2, AIC, and BIC were computed (Table 2). According to these model selection indices and interpretability of the results of the model, we concluded that the four latent classes model was appropriate for males and females. The results of the four LCA classes model showed that differences between the

Table 3. The Four Latent Classes Model of Risk-Taking Behaviors and Its Covariates Among Male Students.

	Latent class			
	Low risk	Cigarette and hookah smoker	Sexual and drinking risk takers	High risk
Latent class prevalence	0.771	0.054	0.042	0.133
Item-response probabilities	Probability of a "Yes" response			
Smoking	0.168	**0.589***	0.000	**1.000**
Hookah use	0.033	**1.000**	0.178	**0.613**
Alcohol use	0.024	0.098	**0.657**	**0.737**
Substance abuse	0.028	0.208	0.477	**0.627**
Sexual risk behavior	0.056	0.010	**0.930**	**0.551**
Covariates (odds ratio)				
Age (p = .030)	Reference	1.06	1.01	1.13
Marital status (single) (p < .001)	Reference	2.16	3.44	1.06
Religious beliefs (p < .001)	Reference	1.00	0.98	0.97
Parental support(p < 0.001)	Reference	0.95	0.97	0.96

Note. The probability of a "No" response can be calculated by subtracting the item-response probabilities shown above from 1.
* Item-response probabilities >.5 in bold to facilitate interpretation.

Table 4. The Four Latent Classes Model of Risk-Taking Behaviors and Its Covariates Among Female Students.

	Latent class			
	Low risk	Cigarette and hookah smoker	Sexual risk takers	High risk
Latent class prevalence	0.862	0.038	0.057	0.043
Item-response probabilities	Probability of a "Yes" response			
Smoking	0.028	**1.000***	0.037	**0.607**
Hookah use	0.008	**0.547**	0.075	**0.602**
Alcohol use	0.013	0.348	0.087	**0.624**
Substance abuse	0.028	0.000	0.000	**1.000**
Sexual risk behavior	0.001	0.264	**1.000**	**0.538**
Covariates (odds ratio)				
Age (p = .030)	Reference	0.99	1.00	1.15
Marital status (single) (p < .001)	Reference	0.55	6.67	1.70
Religious beliefs (p < .001)	Reference	0.97	0.99	0.95
Parental support (p < .001)	Reference	0.99	1.00	0.96

Note. The probability of a "No" response can be calculated by subtracting the item-response probabilities shown above from 1.
*Item-response probabilities >.5 in bold to facilitate interpretation.

expected and observed frequency of response patterns were not statistically significant (G^2 = 12.0, df = 17, p = .80). After finalizing the four latent classes model, we entered age, marital status, religious beliefs, and parental support as covariates in LCA model. The results are shown in Tables 3 (males) and 4 (females), which include latent class prevalence and item-response probabilities as well as odds ratio of covariates associated with latent class membership.

The probability of membership in each latent class is shown in the first row of Tables 3 and 4. Nearly 77% and 13.3% of male students were *low risk* and *high risk*, respectively. For females, nearly 86% and 4.3%were *low risk* and *high risk*, respectively.

The conditional probabilities of a "Yes" response to each risk-taking behavior are listed in Tables 3 and 4. The probability of a "No" response can be calculated by subtracting the item-response probabilities from 1. These probabilities form the basis for interpretation and labeling of the latent classes. The larger conditional probabilities are in bold to highlight the overall pattern. Latent Class 4, *high risk*, was characterized by a high probability of responding "Yes" to all of the risk-taking behaviors. Individuals in this latent class were likely to report that they had engaged in all the study's risk-taking behaviors. In contrast, those in Latent Class 1, *low risk*, were likely to report not having engaged in any of the risk-taking behaviors. There were two other latent classes that reflect

different patterns of risk-taking behaviors. Latent Class 2, *cigarette and hookah smoker*, had a high probability of reporting two types of risk-taking behavior, namely, smoking and hookah using. For males (Table 3), those in Latent Class 3, *sexual and drinking risk takers*, had a high probability of reporting two other types of risk-taking behaviors, which were alcohol use and sexual risk behavior. For females (Table 4), those in Latent Class 3, *sexual risk takers*, had a high probability of reporting only one type of risk-taking behavior, that is, sexual risk behavior.

The odds ratio indices of membership in each class, compared to the first class, and associated with the independent variables are also listed in Tables 3 and 4. For example, as can be seen in Table 3, for 1 year increase in age, the risk of membership in Classes 2, 3, and 4, compared to Class 1, increases too. Similarly, being single, compared to being married, increases the risk of membership in Classes 2, 3, and 4, compared to Class 1. Having higher religious-beliefs score does not change the risk of membership in *cigarette and hookah smoker* class but decreases the risk of membership in Classes 3 and 4, compared to Class 1. Finally having higher parental support score decreases the risk of membership in Classes 2, 3, and 4, compared to Class 1.

Discussion

The results of the study reported the prevalence of each risk-taking behavior, namely, smoking, hookah use, alcohol use, substance abuse, and sexual risk behavior. Smoking was common behavior with a rate of prevalence of 15.8%, and substance abuse was uncommon with a prevalence rate of 7.6%. The results suggested that the prevalence of the risk-taking behaviors was more common among males, compared to females. These findings are supported by similar studies conducted in Iran (Hajian, Khirkhah, & Habibi, 2011; Mazloomy, Ehrampoush, Servat, & Askarshahi, 2010; Moumennasab, Najafi, Kaveh, & AhmadPour, 2006). In comparison to the prevalence of risk-taking behaviors among college students in the other countries, our findings were considerably smaller (Abolfotouh, Bassiouni, Mounir, & Fayyad, 2007; Brown & Vanable, 2007; Lee & Tsang, 2004; Ruangkanchanasetr, Plitponkarnpim, Hetrakul, & Kongsakon, 2005). Lower rates of risk-taking behaviors among college students in Iran may be attributed to cultural values of Iranian families as well as the religious and legal prohibition of alcohol and drug use.

Considering co-occurrence, co-changing is one of the most effective approaches in prevention of high-risk behaviors. Numerous studies have emphasized on the co-occurrence of risky behaviors. For example, co-occurrence of alcohol drinking and violence (Buskirk & Janish, 2012; Livingston, 2011; Proescholdt, Walter, & Wiesbeck, 2012), substance abuse and high-risk sexual behaviors (Buffum, 1988; Cryan & Perry, 2011; Lau, Tsui, Lam, & Lau, 2007; Lopez, Krueger, & Walters, 2010), and alcohol drinking and high-risk sexual behaviors (Snipes & Benotsch, 2013; Weiser et al., 2006) have been documented. We examined risk-taking behaviors differently and identified four latent classes for males and females. For males, the four latent classes are the following: (a) *low risk*, (b) *cigarette and hookah smoker*, (c) *sexual and drinking risk-takers*, and (d) *high risk*. For females, they are (a) *low risk*, (b) *cigarette and hookah smoker*, (c) *sexual risk-takers*, and (d) *high risk*. In addition to the third class, the prevalence of classes in the two sex groups was different.

Nearly 77% and 13.3% of male students were found to be *low risk* and *high risk*, respectively. Among females, 86% and 4.3% were *low risk* and *high risk*, respectively. In accordance with previous studies in Iran, it was expected that the prevalence of latent classes among males would be different from females (Hajian et al., 2011; Mazloomy et al., 2010; Moumennasab et al., 2006).

There are studies that show that parental protective role and parental control/monitoring are effective in protecting young adults against high-risk behaviors (Ennett et al., 2008; Li, Stanton, & Feigelman, 2000; Piko & Balazs, 2012). The results of our study suggest that having higher parental support score decreases the risk of membership in the *cigarette and hookah smoker* class, *sexual and drinking risk takers* class, and *high risk* class, compared to *low risk* class, among male college students. The same were observed among female college students with one exception, that is, the parental support did not change the risk of membership in the *sexual risk-takers* class.

The findings of the present study are consistent with several other studies that demonstrated the role of religiosity and religious beliefs in the prevention of high-risk behaviors (Farhadinasab et al., 2008; Gryczynski & Ward, 2011; Rabinowitz et al., 2009). The results reported that having higher religious beliefs score decreases the risk of membership in the *cigarette and hookah smoker* class, *sexual risk-takers* class, and *high risk* class, compared to *low risk* class, among female college students. The same results were observed among male college students with one exception, that is, the religious beliefs score did not change the risk of membership in the *cigarette and hookah smoker* class.

Limitations

The study's large representative sample added to the external validity of the results. The study was delimited to the variables that were investigated. Due to the cross-sectional nature of the study, no causal inferences were

drawn. Due to the retrospective nature of the study, the collection of data relied on recollection of past events. It was assumed that the respondents were honest in answering the questions and providing the required data.

Conclusion

Our study represents the co-occurrence of risky behaviors by subgrouping a sample of college students into four classes. Results reveal considerable percentage of students, males in particular, are in the *high risk* class, which stresses the necessity of implementing preventive interventions for this stratum of young people. In addition, we found that familial support and religiosity may serve as preventive factors in risk-taking behaviors. Consequently, focusing on familial support and religious beliefs may be helpful in designing and executing effective preventative programs, which can be instrumental in the development of comprehensive health education programs with the goal of empowering individuals as well as the community.

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